## REMARKS

Claims 1 and 2 are pending. Applicants propose amendment of claim 1. A marked-up version showing the proposed amendment is attached hereto as "**Version with markings to show changes made**."

**Applicants' Response to the Examiner's Maintained §103 Rejection**

The Examiner has maintained his position that Applicants' invention would have been obvious to one skilled in the art because ***Nagai et al.*** teaches the majority of the components of the alloy and ***Stern*** teaches the use of the remaining component, Y added at 0.01-0.10 wt%.

In response to Applicants' argument that ***Stern*** teaches adding Y for the purpose of reacting with an amount of Al too high for the present invention, the Examiner in the July 18, 2002 Office Action and the December 18, 2002 Office Action states that though ***Stern*** does not teach the same reason for adding Y, it has been held that where the prior art suggests doing what Applicants have done, though for different reasons, an obviousness rejection still stands.

The Examiner further states that ***Stern*** teaches that the Y enhances the high temperature capabilities, affecting the grain boundaries and stabilizing aluminum. Therefore, the enhanced properties gained by adding Y are not achieved only in combination with 2.5-4.5 wt% Al. Thus, the Examiner concludes that ***Stern*** teaches that the effects of Y are not dependent upon Al being present.

In response to Applicants' argument that ***Stern*** teaches a brazing alloy with too high a brazing temperature, the Examiner holds that the effects of Y are not dependent upon the brazing temperature of the alloy.



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Namely, the Examiner's position is that ***Stern*** in essence discloses that it is a good idea to always add Y at a 0.01 to 0.10 amount to any Ni based alloy. Applicants respectfully submit that this interpretation of ***Stern*** by the Examiner is beyond the scope of what ***Stern*** actually teaches.

First, ***Stern*** is a limited reference because it is teaching a brazing alloy to be used for brazing a very specific type of alloy. ***Stern*** repeatedly states that its brazing alloy has limited applications.

- ". . . suitable for brazing gamma and gamma prime strengthened superalloys at temperatures as low as 2150°F." (Abstract);
- ". . . particularly suitable for brazing nickel base superalloys . . ." (col. 1, line 68 to col. 2, line1);
- ". . . this invention exhibits improved strength, uniformity of hardness and improved micro-structure, particularly with nickel based gamma prime strengthened superalloys. . ." (col. 3, lines 6-9).

***Stern*** describes gamma prime strengthened superalloys as those that contain tertiary phase $Ni_3AlTi$. This limited use is so important to the invention that it is included in the claims.

- ". . . suitable for brazing nickel base superalloys . . ." (Claim 1);
- ". . . suitable for bonding gamma prime superalloys at about 2150°F to 2300°F . . ." (Claim 2);
- ". . . for brazing gamma-gamma prime type nickel base superalloys . . ." (Claim 3).

This limited utility of the disclosed brazing alloy would not have lead one skilled in the art to combine ***Stern*** with a broader scope alloy such as that of ***Nagai et al.*** or the present invention, both of which are for "brazing stainless steel to produce various kinds of products" (*see* specification, page 1).

As such, Applicants' invention is not obvious because one skilled in the art would not have been motivated to add Y to ***Nagai et al.*** based on ***Stern's*** use of Y in a very specific alloy.

In regard to the Examiner's argument that one skilled in the art would combine ***Stern*** without the use of excessive Al, Applicants respectfully submit that the Examiner's position does not read on ***Stern*** as a whole. ***Stern*** clearly teaches away from using yttrium without excessive Al. Every example in ***Stern*** and every claim teaches an alloy composition with at least 2.5% Al, far beyond the 0.01 to 0.10% limit allowed for in the present invention.

***Stern*** teaches that Al at this concentration is a necessary component to the alloy. "[It] is gamma prime strengthened and slightly suppresses the brazing temperature" (col. 4, lines 22-23). The primary purpose of adding yttrium is to combine with the aluminum "to improve oxidation and sulfidation resistance" (col. 9, lines 24-26). As disclosed in ***Stern***, yttrium, when combined with Al, has a specific effect in regard to nickel based brazing alloys for brazing super alloys. "In the . . . alloy of this invention, yttrium modifies or affects the basic structure of the alloy . . ." (col. 4, lines 33-34) (emphasis added). "The brazing alloy of this invention is a medium chromium cobalt free NiCrAlY-type brazing alloy . . ." (col. 1, lines 55-56).

Further, it is necessary for ***Stern's*** alloy to comprise Y and Al in a total amount of 2.51-5.06%, which is a very large amount in comparison with 0.01-0.10 wt.% of the present invention. By using Al in an amount of more than 0.10 wt.% the desired advantages of the present invention cannot be obtained as shown in Table 2 (c) of this specification.

Yttrium is not disclosed by ***Stern*** as a standard component which would improve any Ni-based alloy as the Examiner suggests.

Applicants propose amendment of claim 1 to include the limitation that brazing takes place at 1100°C. In regard to the temperature difference between ***Stern***, the present invention and ***Nagai et al.***, the Examiner maintains that yttrium would be usable in either temperature range (page 3, Office Action of 12/18/02). In fact, the Ni-base brazing alloy disclosed in ***Stern*** has a brazing temperature of 2150 to 2300°F (1176 to 1260°C) and accordingly cannot be brazed at 1100°C. Therefore, one skilled in the art would not have been motivated to use yttrium in the lower brazing temperature alloy of ***Nagai et al.***

In addition, the Examiner does not address why one skilled in the art would be compelled to add yttrium to ***Nagai et al.*** when the reference does not state a need for high temperature corrosion resistance. ***Stern*** does not teach that the temperature corrosion resistance of yttrium would be universal to any Ni-based alloy. In fact, ***Stern*** implies the opposite. ***Stern*** implies that yttrium enhances the high temperature capabilities because it interacts with Al. ***Stern*** reads in relevant part:

> "Yttrium enhances the high temperature capabilities of the brazing alloy. In the nickel based brazing alloy of this invention, yttrium modifies or affects the basic structure of the alloy, affecting the grain boundaries and stabilizing the aluminum." (col. 4, lines 31-35) (emphasis added).

In other words, yttrium reacts in a "NiCrAlY-type brazing alloy" (col. 1, line 56) to properly form with superalloys that contain the tertiary phase $Ni_3AlTi$ (col. 3, lines 11-12). There is no disclosure that yttrium reacts with any Ni-based alloy to enhance its high temperature capabilities.

In conclusion, Applicants respectfully submit that one skilled in the art would not have been motivated to combine the ***Nagai et al.*** reference with ***Stern*** to derive the current invention. ***Stern*** discloses a brazing alloy with a limited utility. The brazing alloys of the current invention and ***Nagai***

***et al.*** are particularly distinct from that of ***Stern***. The Ni-base brazing alloy of the present invention comprises a large amount of Cr, *i.e.*, 25-35% to improve the strength of the alloy and the corrosion resistance in sulfuric acid. Generally, the Ni-base brazing alloy comprising such a large amount of Cr forms slags when brazed (*see* Table 2, (a) and (b) of the specification). In the present invention, the problem can be effectively dissolved by adding at least one selected from the group consisting of Al, Ca, Y and misch metal in an amount of 0.01-0.10 wt.%.

On the contrary, ***Stern*** discloses only Ni-base brazing alloy comprising Cr in an amount of 12-14% (*see* descriptions at col. 2, lines 9 and 34-36; col. 3, lines 31 and 43; col. 4, line 68; and claims, and never teaches any alloy comprising Cr in an amount of more than 14%, such as 25-35%.

***Stern*** teaches the use of Y for a specific purpose which does not coincide with the alloy of ***Nagai et al.*** ***Stern*** teaches the use of Al at a specific percentage weight outside the scope of the present invention. Finally, ***Stern*** teaches a brazing temperature beyond that of ***Nagai et al.*** and the present invention.

In view of the aforementioned amendments and accompanying remarks, claims, as amended, are in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicants undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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Enclosures: Version with markings to show changes made
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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**
**U.S. PATENT APPLICATION SERIAL NUMBER 09/878,333**

**IN THE CLAIMS:**

**Claim 1 has been amended as follows:**

1. (Amended) A Ni-base brazing alloy comprising

Cr in an amount of 25 to 35% by weight,

P in an amount of 4 to 8% by weight,

Si in an amount of 3 to 6% by weight, wherein the total amount of P and Si is 9 to 11.55 by weight,

at least one selected from a group consisting of Al, Ca, Y and misch metal in an amount of 0.01 to 0.10% by weight, and

the balance of Ni and unavoidable impurities, and

being capable of brazing at a brazing temperature of 1100°C.